

"GHOST'S EARS" (*Exobasidium* sp. affin. *vaccinii*) AND FOOL'S HUCKLEBERRIES (*Menziesia ferruginea* Smith): A UNIQUE REPORT OF MYCOPHAGY ON THE CENTRAL AND NORTH COASTS OF BRITISH COLUMBIA

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ABSTRACT.—The cultural roles of mycocecidia (fungal galls) of the fungus *Exobasidium* sp. affin. *vaccinii* on *Menziesia ferruginea* Smith (false azalea, or fool's huckleberry) among various Pacific northwest coast cultures are identified and discussed. As many as nine distinct coastal groups named and ate these mycocecidia. Among at least three coastal groups, the Henaaksiala, Heiltsuk, and Tsimshian, the mycocecidia had mythological importance.

RESUMEN.—Se identifica y discute el papel cultural de las agallas producidas por el hongo *Exobasidium* sp. affin. *vaccinii* al crecer sobre *Menziesia ferruginea* (cuyos nombres vernáculos en inglés se traducen como "azalea falsa" y "arándano de tontos") entre las culturas de la costa noroccidental de Norteamérica. Nueve diferentes grupos de la costa nombraban y comían estas agallas. Entre al menos tres grupos costeros, los Henaaksiala, Heiltsuk y Tsimshian, las agallas fungosas tenían importancia mitológica.

RÉSUMÉ.—Le champignon *Exobasidium* sp. affin. *vaccinii* produit des galles sur *Menziesia ferruginea* Smith ("fausse azalée"). Le rôle de ces galles dans la culture de différents peuples ou groupes autochtones de la côte nord-ouest du Pacifique est identifié et discuté ici. Jusqu'à neuf de ces peuples ont nommé, et utilisé les galles d'*Exobasidium* comme nourriture. Chez au moins trois groupes, les Henaaksiala, les Heiltsuk et les Tsimshian, les galles avaient une importance mythologique.

The Heiltsuk are one of several Indigenous Peoples whose traditional territory embraces part of the central coast of British Columbia. In one of their myths, "Raven and Squirrel," Squirrel invited all the people, with the exception of their chief, Raven, to feast on berries at his house. Feeling slighted, Raven retaliated by producing talking excrements that lured Squirrel's guests from the house long enough to allow Raven to sneak in and eat the berries (Boas 1928:34-35, 1932:19; cf. Boas 1977:233). The following paper represents an attempt to clarify the nature of this unidentified "berry" and its associated indigenous terminology.¹

In one version of the tale involving Raven and Squirrel these "berries" are referred to by the Heiltsuk name *Lí'nxwas* (or *λinx^{was}*)² but their botanical identity is unspecified (Boas 1928:35). Boas also recorded the comparable Heiltsuk term *L!Enq!was* (or *λnq^{was}*), which he interpreted as referring to "a berry" (Boas 1928:287). These terms correspond to other terms in the Upper North Wakashan

isolects, i.e., Henaaksiala, Haisla, Heiltsuk, and Oowekyala, that were previously regarded as separate and apparently related, yet ambiguously defined, viz., Henaaksiala/Haisla $\lambda\eta k^{\omega}as$, Heiltsuk $\lambda\eta k^{\omega}ás$, and Oowekyala $\lambda\eta k^{\omega}as$; and, in contrast, Henaaksiala/Haisla $\lambda\eta q^{\omega}as$, $\lambda\eta q^{\omega}às$, Heiltsuk $\lambda\eta q^{\omega}ás$, and Oowekyala $\lambda\eta q^{\omega}as$ (Lincoln and Rath 1980:184, 1986:346; Rath 1981:601). All of these terms have been translated as referring to some type of plant either with or without "berries." In addition, Lincoln and Rath (1986:492) have questioned the legitimacy of the linguistic root ($\sqrt{\lambda nk^{\omega}-}$) that was originally interpreted as the basis for the first three of the preceding series of Upper North Wakashan terms.

As a result of recent transcriptional revisions utilizing the testimony of the late Henaaksiala elder Gordon Robertson, a Henaaksiala speaker, the dubious Upper North Wakashan root, RL985 (i.e., root list #985), $\sqrt{\lambda nk^{\omega}-}$ (Lincoln and Rath 1980:184, 1986:492) and its derivatives (Henaaksiala/Haisla $\lambda\eta k^{\omega}as$, Heiltsuk $\lambda\eta k^{\omega}ás$, and Oowekyala $\lambda\eta k^{\omega}as$) have been rejected (John Rath, personal communication, 1988) in favor of RL986, $\sqrt{\lambda nq^{\omega}-}$ (Lincoln and Rath 1980:184, 1986:492). However, the terms derived from this latter root, i.e., Henaaksiala/Haisla $\lambda\eta k^{\omega}as$ or $\lambda\eta q^{\omega}às$ (Gordon Robertson and John Rath, personal communications, 1988; cf. Lincoln and Rath 1986:346), Heiltsuk $\lambda\eta q^{\omega}ás$ and Oowekyala $\lambda\eta q^{\omega}as$, have emerged with conflicting definitions: plant (unidentified) without berries (Lincoln and Rath 1980:184); plant (unidentified) with either red or purplish edible berries (Lincoln and Rath 1986:346, 1980:184; Rath 1981:601); red or blue kind of huckleberry (Lincoln and Rath 1986:492); or something associated with one's nose as well as a "berry" which shares the physical characteristics of the contents of one's nose (Lincoln and Rath 1986:346).

From additional testimony provided by Gordon Robertson and several other Native elders of coastal British Columbia it may now be seen that each of the definitions associated with Henaaksiala $\lambda\eta q^{\omega}as$, Heiltsuk $\lambda\eta q^{\omega}ás$, and Oowekyala $\lambda\eta q^{\omega}as$ describes aspects of the botanical referents of these terms. Evidence related to these referents was obtained when Gordon Robertson and Heiltsuk-speakers Mary Hunt, and the late Annie M. Wilson and Maggie Windsor identified Henaaksiala/Haisla $\lambda\eta q^{\omega}as$ and Heiltsuk $\lambda\eta q^{\omega}ás$ as referring, at least in part, to *Menziesia ferruginea* Smith, an ericaceous plant known as fool's huckleberry,³ mock azalea, rusty-leaf, rusty menziesia and, more commonly, false azalea (Hitchcock and Cronquist 1973:345). Annie Wilson also indicated that the Heiltsuk name $\lambda\eta q^{\omega}ás$, said to mean "sad plant," can be used to refer to an unidentified plant with droopy branches, possibly some type of willow (*Salix* sp.) (cf. Lincoln and Rath 1980:184). According to Gordon Robertson, the name for *M. ferruginea* in the Henaaksiala and Haisla languages derives from the development of reportedly mucous "berries" (cf. Lincoln and Rath 1986:346) on the leaves, flowers, and stems. These "berries" have been noted by Mary Hunt and Annie Wilson, who refer to them in Heiltsuk as $p'sp'iyú yis luát$, literally, 'ear of ghost'.⁴

A gloss equivalent or loan translation for the Heiltsuk term $p'sp'iyú yis luát$ in the Southern Tsimshian language (Sküüxs) was verified by Kitsoo elder Violet Neasloss and the late Haihais elder Louisa Hall, both of Klemtu, one of two Native communities in which Southern Tsimshian is still spoken. This term is Sküüxs $ts'imú \cdot kinó \cdot nk'$ (also, Sküüxs $ts'im mú \cdot ki nánəq'$ or Sküüxs $ts'imu \cdot xinó \cdot nk'$, literally, 'in ear-ghost,' or "ghost ear") (John Dunn, personal communication,

1990; Marie-Lucie Tarpent, personal communication, 1990). The aforementioned Heiltsuk and Southern Tsimshian terms are all essentially semantically equivalent.

Although he referred to the edible structures emanating from Henaaksiala/Haisla $\lambda\eta\acute{q}^{\omega}as$ as "berries," Gordon Robertson described these structures in a way that suggested they may actually represent a plant structure parasitized by a fungus. *Exobasidium vaccinii* (Fuckel) Woronin, a fungal parasite of *M. ferruginea*, seemed a likely candidate (Robert Bandoni, personal communication, 1988; Ginns 1986:135). Research in Canada by Drs. Nancy Nickerson (personal communication, 1990) and Savile (cf. Savile 1959:648) and in Sweden by Nannfeldt (cf. Nannfeldt 1981:6–10, 63–64) indicates, however that the fungus on *M. ferruginea* is probably a species distinct from *E. vaccinii* (J. A. Parmelee, personal communication, 1990) that has a very restricted host range. D. Savile (personal communication, 1990) recommends that this fungus be referred to as *Exobasidium* sp. affin. *vaccinii* until it can be further studied, properly described, and named.

The botanical Latin identity of the "berries" growing on *M. ferruginea* was confirmed in 1990. Gordon Robertson examined fresh specimens of *Exobasidium* sp. affin. *vaccinii* parasitic on *M. ferruginea*, obtained from Prince Rupert, British Columbia (Compton #187, 6 June 1990, UBC #F13569) and near Vancouver (Wells & Hiebert #1762, 28 July 1990, UBC #F13570).⁵ He confirmed that these fungi were the "berries"⁶ of the plant named $\lambda\eta\acute{q}^{\omega}as$ in Henaaksiala and Haisla. This leads to the conclusion that these "berries" are equivalent to the "ghost ears" described by Mary Hunt, Annie Wilson, Violet Neasloss, and Louisa Hall. Furthermore, Mildred Wilson of Hartley Bay verified the Coast Tsimshian (Sm'algyax) term *tsmuu'no:nax* in reference to a photograph of *E.* sp. affin. *vaccinii* on false azalea (see Fig. 1). This term, said to mean "ear ghost," is reported to be derived etymologically from Sm'algyax *tsmuu'm b'aa'lx*, literally, 'in-ear-modifier clitic-ghost.' Mildred Wilson also referred to the fungus as Sm'algyax *tse'ax*, said to mean 'ear wax' or 'deaf,' although the proper term for 'deaf' is Sm'algyax *sqawk*. The former term, Sm'algyax *tse'ax*, "running ear," more correctly refers to an ear discharge (Margaret Seguin, personal communication, 1991). People in Hartley Bay refer to the shrub on which this "berry" grows as Sm'algyax *sqan tse'ax*, a term that incorporates the Coast Tsimshian word for shrub (Mildred Wilson).

Exobasidium species are parasites lacking a distinct fruiting body that usually confine their host range to members of Ericaceae (Frankland et al. 1982:11; Smith 1908:422). *Exobasidium* spores may infect the leaves, stems, and flowers of false azalea, resulting in organ deformation and hypertrophic growth that accompanies fungal development (cf. Rae 1922:725; Savile 1959:648; Sinclair et al. 1987:26–27). Eventually the fungus sporulates on the surface of mycocecidia (fungal galls) that range from 1–2 cm in size and are indeed somewhat berry-like (i.e., they are globular, somewhat sweet, and crisp). Although the mycocecidium produces a whitish bloom when sporulating (Sinclair et al. 1987:26–27; Smith 1908:423; Annie Wilson), the immature structure may be pale rose (Smith 1908:423), as observed in a recent collection (Wells & Hiebert #1762, 28 July 1990, UBC). When pale-rose colored, the "berries" are considered ripe (Gordon Robertson). Further, Smith (1908:423) has noted that "red or purple patches occur on the upper surface of the leaves (which are infected by *Exobasidium*), opposite to the portion occupied by the fungus below." The claims that Henaaksiala/Haisla $\lambda\eta\acute{q}^{\omega}as$ /Heiltsuk



FIG. 1.—The “berries” of fool’s huckleberry: *Exobasidium* sp. affin. *vaccinii* infection resulting in deformation and hypertrophy of leaves and flowers of *Menziesia ferruginea* (photo by Brian D. Compton).

ληῖῖῖ/Ḫowekyala ληῖῖῖ has red or purplish berries can thus be attributed to the morphological characteristics of *E. sp. affin. vaccinii* and the host response to its infection.

Because false azalea does not produce true berries, claims by some Native individuals that Henaaksiala ληῖῖῖ/Heiltsuk ληῖῖῖ/Ḫowekyala ληῖῖῖ lacks berries are also explained (cf. Lincoln and Rath 1980:184). The fungal structures are prominent only during the summer, particularly in July (Gordon Robertson). This fungus is not uncommon in the Pacific Northwest but it may be sporadic in occurrence (possibly due to climatic factors) or simply frequently overlooked.⁷

Although the mycocecidia have been described by Gordon Robertson as resembling “snot,” he, Mary Hunt, Annie Wilson, and Maggie Windsor all attested to their edibility. Mildred Wilson said that children in Hartley Bay enjoy eating the “crunchy” fungus but that it was too sweet for her.⁸ Because the fruits of false azalea are unpalatable capsules, the possibility exists that the “berries” of Squirrel’s feast are *E. sp. affin. vaccinii*.

Both *Exobasidium* sp. affin. *vaccinii* and *Menziesia ferruginea* are further involved in Henaaksiala and Tsimshian mythology. As a child, Gordon Robertson learned from his Tsimshian grandfather and various Henaaksiala elders the story of Henaaksiala ḫḫḫḫ, a creature known to steal corpses (cf. Olson 1940:195–196): “That ḫḫḫḫ blew [its] nose and threw it and it hit those little bushes and that’s

why it grows there [i.e., on the leaves of *M. ferruginea*]." Elsewhere in the area comparable creatures are known for undesirable actions, such as kidnapping children. Thus the *č'lgikla* is remembered among the Henaaksiala not only for its heinous acts, but also for causing *ληq'was* (or *ληq'as*) to have its own "berries."

This paper represents the first report for British Columbia in which *Exobasidium* sp. affin. *vaccinii* has been identified as a culturally recognized associate of *M. ferruginea*. It corroborates and clarifies Gorman's (1896:76) observation that the Haida are fond of and eat apparently comparable structures raw. Gorman, however, erroneously attributed the edible portion to a gall-forming insect. Outside British Columbia, the use of *E. sp. affin. vaccinii* as food has been reported among Eskimo peoples of Cordova on Prince William Sound and in Port Graham on the lower Kenai Peninsula, Alaska. In the Sugpiak language spoken at Prince William Sound this fungal gall is known as *piugtem cuutii*; in Sugpiak spoken at Port Graham it is known as *cuuteruaq*, literally, 'dog ears' (Alix Wennekens, personal communication, 1990).

The use of *E. sp. affin. vaccinii* is perhaps not limited in British Columbia to the area encompassed by the Haida, Haihais, Henaaksiala, Heiltsuk, Coast Tsimshian, and Southern Tsimshian cultures (see Fig. 2). The existence of the Oowekyala term *ληk'was* implies that the Oweekeno may have eaten this fungus. Furthermore, Boas (1947:130) referred to the Kwak'wala term *pō'xwas* (**puxwas*)⁹, which was said to refer to the "fruit of *Menziesia ferruginea* Smith," indicating that the Kwakwaka'wakw also recognized and possibly ate this fungus (cf. Boas 1921:1402, 1455, 1910:222–23). The reference to Kwak'wala *pō'xwas* as a "fruit," in conjunction with Gordon Robertson's comments that these are "berries," provide evidence that Native people recognize the berry-like appearance of *M. ferruginea* infected by *E. sp. affin. vaccinii*.¹⁰ Note, however, that Kwak'wala **puxwas* was said by Boas to refer to "willow tree" (Lincoln and Rath 1980:63; Neville Lincoln, personal communication, 1990), although this Kwak'wala word was not known to contemporary Kwak'wala speakers who were consulted (Neville Lincoln, personal communication, 1990).

There is further suggestive evidence among the Haida that these fungal galls represent "berries." *Menziesia ferruginea* is known as 'raven's berry bush' (Turner and Levine 1971:83), although the reason for this name is unclear. There is evidence that either *E. sp. affin. vaccinii* or *M. ferruginea* has been regarded by speakers of North Wakashan tongues, Tsimshianic languages, and the Haida language as a "berry." Specifically, Gordon Robertson has indicated that *E. sp. affin. vaccinii* mycocecidia are regarded as true "berries" (referred to in Henaaksiala and Haisla as *māmłkimas*) in the Henaaksiala sense¹¹ and Mildred Wilson also regards them as "berries." However, it is currently unclear whether Heiltsuk *pspiyú yis luát* Heiltsuk *ληq'was* and Oowekyala *ληq'was* can be referred to the Heiltsuk and Oowekyala *berry* folk botanical classes (Heiltsuk *gúlali/gúg'łímás* and Oowekyala *gúlali*) or whether the comparable Coast Tsimshian and Southern Tsimshian taxa may be regarded as *berries*. With the exception of Turner and Levine's (1971) work, no previous studies of Pacific Northwest Native ethnobotany and folk biological classification systems indicate such a likelihood. On the other hand, Gordon Robertson's comments imply that this fungus would traditionally be regarded as a *berry* throughout Upper North Wakashan folk

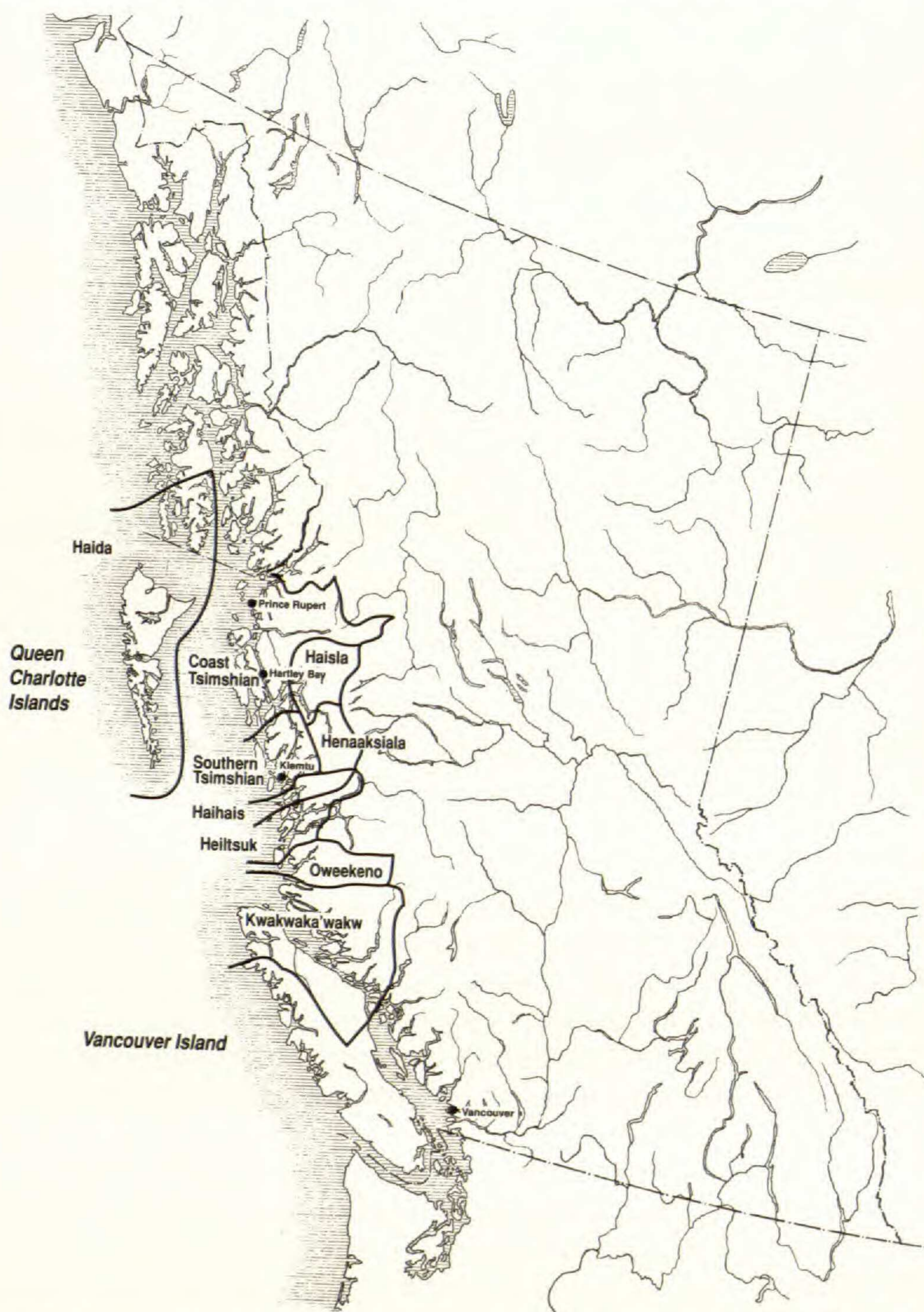


FIG. 2.—Approximate locations of British Columbian ethnolinguistic groups discussed in the text.

botanical classification. Additional ethnobotanical research among other Indigenous Peoples of British Columbia and Alaska may result in the documentation of more widespread recognition and use of *E. sp. affin. vaccinii* and Native perception that this fungus is a type of *berry*.

Evidently neither *M. ferruginea* nor *E. sp. affin. vaccinii* has great significance in terms of their relative contributions to the nutritional and technological pursuits of the North Wakashan, Coast Tsimshian, and Southern Tsimshian peoples and their neighbors. These species are significant, however, because of the evidence they offer for Native recognition of an understudied host-pathogen rela-

tionship as well as for a rare instance of mycophagy among coastal peoples of British Columbia. The research reported here is significant for illustrating the importance of making cross-cultural folk biological comparisons within the North Wakashan and Tsimshian ethnolinguistic areas. Specifically, I have identified an intriguing distinction between the manner in which speakers of Henaaksiala, Heiltsuk, and Southern Tsimshian relate *E. sp. affin. vaccinii* to other folk taxa. In addition, I have documented previously ignored Heiltsuk, Henaaksiala, and Tsimshian mythological roles for one or, possibly, both of these species. This study illustrates the importance of continuing ethnobiological research on North American organisms or biological associations that are distinguished by, and significant to, the Native people who share their environment. It also indicates why otherwise seemingly insignificant or obscure botanical organisms such as *Exobasidium sp. affin. vaccinii* should not be overlooked in ethnobiological studies because they may be integral to the understanding of interesting and unique cultural relationships to native plants and fungi.

NOTES

¹The indigenous isolects and languages significant to this research are classed in the Wakashan and Tsimshianic language families. The term "isolect" refers to Upper North Wakashan tongues of undefined scope (Nater 1987:239, footnote 2). Within Upper North Wakashan, Heiltsuk (with two dialects, Bella Bella and Klemtu) and Oowekyala are regarded as isolects, although Henaaksiala and Haisla are treated as separate languages (Neville J. Lincoln, personal communication, 1992). The phonemic inventory used in the transcription of terms from the North Wakashan tongues (Henaaksiala, Haisla, Heiltsuk, Oowekyala, and Kwak'wala, spoken by the Kwakwaka'wakw) cited in this paper is after Lincoln and Rath (1980, 1986) and Rath (1981). The phonemic inventory is as follows: consonants - *b, d, z, λ, g, g^ω, ġ, ġ^ω* (plain plosives); *p, t, c, χ, k, k^ω, q, q^ω* (aspirated plosives); *p̣, ṭ, c̣, χ̣, ḳ, ḳ^ω, q̣, q̣^ω* (glottalized plosives); *s, ṭ, x, x^ω, ʃ, ʃ^ω* (fricatives); *m, n, l, y, w, h* (plain resonants); *ṃ, ṇ, ḷ, ỵ, ẉ, ḥ* (glottalized resonants); *ṃ, ṇ, ḷ* ("vocalic resonants"); *ṃ, ṇ, ḷ* (glottalized "vocalic resonants"); vowels - *ə, i, u, a* (plain); *í, ú, á* (glottalized); other elements - *:* (reduplication boundary), *:* (juncture), *?* (glottalizing juncture). The symbol "^ω" is used to indicate lip-rounding, an articulatory feature characteristic of those obstruents indicated. Accent, when unpredictable, is indicated by use of the grave (`). In the case of the Heiltsuk tongue the acute (´) over a vowel or vocalic resonant indicates high tone, its absence indicates low tone. Generally, slashes (/ . . . /) are used to indicate a phonemic level of transcription, but they are omitted with the understanding that all Upper North Wakashan terms are in phonemic transcription.

Southern Tsimshian terms presented in this paper are from field notes and tape recordings I made in Klemtu. Terms were transcribed by John A. Dunn. The phonemic inventory used is essentially that of Halpin and Seguin (1990:267) for Coast Tsimshian. It was used in transcribing Coast Tsimshian forms communicated to me by Dr. Seguin, with some minor orthographic variations. The Coast Tsimshian phonemes are: (plain stops and affricate) *p, t, c, k, k^ω, q, ?*; (glottalized stops and affricate) *p̣, ṭ, c̣, ḳ, ḳ^ω, q̣*; (continuants) *s, ṭ, x, h*; (plain sonorants) *m, n, l, w, u, ỵ*, (an unrounded velar glide); (glottalized sonorants) *ṃ, ṇ, ḷ, ẉ, ỵ, ỵ̣*; (short vowels) *i, e, a, o, u*; (long vowels) *iː, eː, ([ɛː]) aː, oː, uː, tː*; (stress) *ˑ*. The plain nonglottal stops and affricates are contextually voiced to [b], [d], [ʔ], [g], [g^ω], [ġ], the velars are palatalized to [kʲ, gʲ] and [ḳʲ] before *o(ˑ)* or *u(ˑ)* and optionally before other vowels. It may be possible to analyze the vowel system as having only three phonemic short vowels, with what are here written as *i* and *e* as allophones of *i*, and *u* and *o* as

allophones of u. The Sugpiak term reported in the paper is presented in the form communicated to me by A. Wennekens.

²The forms in parentheses here and in the following sentence were written by Neville J. Lincoln using the contemporary orthography presented by Lincoln and Rath (1980, 1986).

³This common name is probably based on the failure of *M. ferruginea* to produce berries (it produces capsules) although it is similar in appearance and related to other berry-producing species in the Ericaceae, (i.e., huckleberries).

⁴Single quotation marks are used to denote literal translations of non-English terms. Double quotation marks indicate approximate English glosses, terms quoted by one or more Native consultants, or items cited verbatim from a published source.

⁵These specimens were identified by J. A. Parmelee, Economic Fungi Project, Agriculture Canada Biosystematics Research Centre, Ottawa, Ontario. They are deposited at the Herbarium of the Department of Botany at The University of British Columbia in Vancouver (UBC).

⁶This is how Mr. Robertson referred to these fungi in English, although they are not berries in the botanical sense.

⁷Tom C. Wells (personal communication, 1990) has monitored several Pacific Northwest populations of *M. ferruginea* over the last several years, but has not found this fungus to be common among those populations.

⁸I have not noted excessive sweetness in the specimens I have tasted.

⁹This word, as indicated by the preceding asterisk, derives from a Kwak'wala root attested by Boas that was found impossible to re-elicited by Lincoln and Rath (1980:viii).

¹⁰Additional evidence of Kwakwaka'wakw knowledge of the "berries" of *M. ferruginea* has been presented by Grubb (1977:69), who recorded that "eating berries [of false azalea] renders one dumb and is potentially poisonous." This belief may refer to uninfected leaves rather than the mycoecidia, however, as Turner and Bell (1973:283) have documented that Kwakwaka'wakw report that chewing the leaves causes loss of speech. It should also be noted that false azalea reportedly contains toxic compounds common to several members of the Ericaceae (Turner and Szczawinski 1991:82).

¹¹The concept of real or true *berries* as defined by Gordon Robertson includes several true native berries, several berry-like fruits, as well as the small round reproductive structures (strobili) of some gymnosperms. Although this concept may correspond to the common nontechnical English folk concept of *berries*, it differs significantly from the botanical definition of a berry as a fruit in which much or all of the ovary wall becomes enlarged and juicy, and which contains seeds within their own hard seed coats (Little and Jones 1980:53).

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Hunt (Heiltsuk), Violet Neasloss, the late Gordon Robertson (Henaaksiala), the late Annie M. Wilson (Heiltsuk), Mildred Wilson (Coast Tsimshian), and the late Maggie Windsor (Heiltsuk). I wish to acknowledge the contributions of the Heiltsuk Indian Band, the Heiltsuk Cultural Education Centre, and the Kitsoo Indian Band and thank them for their assistance. Information regarding Heiltsuk ethnobotany contained in original tape recordings or notes produced on the Heiltsuk Indian Reserve is presented with the permission of the Heiltsuk Indian Band through the contributions of the Heiltsuk Cultural Education Centre. The Band and I share control over access to original data gathered in the research. I thank the following individuals for their aid in the production of this report: Robert J. Bandoni, John A. Dunn, Karl D. Hauffe, M. Dale Kinkade, Suzanne L. Lathrop, Neville J. Lincoln, Jack R. Maze, Nancy L. Nickerson, J.A. Parmelee, John C. Rath, Scott A. Redhead, D.B.O. Savile, W.B. Schofield, Margaret Seguin, Marie-Lucie Tarpent, Nancy J. Turner, Tom C. Wells, and Alix Wennekens. Financial support for this research was provided by grants to me from the Jacobs Research Funds (administered by the Whatcom Museum Society, Whatcom Museum of History and Art, Bellingham, WA), the Phillips Fund (American Philosophical Society, Philadelphia, PA), and from a grant (No. 673747) to Jack R. Maze from the Canada Natural Science and Engineering Research Council.

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